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Circular 1047

BAND SPRAYING

preemergence herbicides

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SPRAYING A PREEMERGENCE HERBICIDE on the soil surface at planting time can provide economical control of weeds that are sometimes difficult to control with cultivation. Band spraying a strip 12 to 14 inches wide over the row can be particularly helpful and less expensive than broadcast application.

Band applications should always be supplemented with timely cultivation for complete weed control.

This circular suggests ways to help you properly apply a liquid preemergence herbicide in a band over the row. This is usually done while planting with a band-spray attachment on the planter, but it may also be done shortly after planting with a separate spraying operation.

Equipment for band spraying

Commercial attachments for planters can be purchased with the planter or the equipment can be added later. If you have a field sprayer, especially a tractor-mounted one, much of it can be adapted for use in band spraying. Figure 1 is a schematic diagram of the necessary equipment and how it can be arranged. It is especially important that the spray nozzles have a uniform application rate across the band. If wettable powders are to be used, it is essential that they be properly mixed and then kept well agitated. A separate line, which is not shown in Figure 1, from the pressure side of the pump to a jet agitator is probably most practical for agitation unless mechanical agitation can be provided. The pump should have at least 6 to 8 gallons per minute excess flow over that needed at the nozzles to provide adequate hydraulic agitation.

Amount of spray solution to apply

Preemergence herbicides for band spraying are commercially available as liquid formulations and as wettable powders. Recommended amounts of a commercial product to apply per acre can be obtained from the container label, from your herbicide supplier, or from your county extension adviser. The commercial product must be mixed with water to form a spray solution or suspension. The recommended broadcast rate for liquid formulations of most herbicides is 10 to 20 gallons of solution per acre. Application rates that are too low can result in clogging of nozzles and screens and in excessive drift because of small particles.

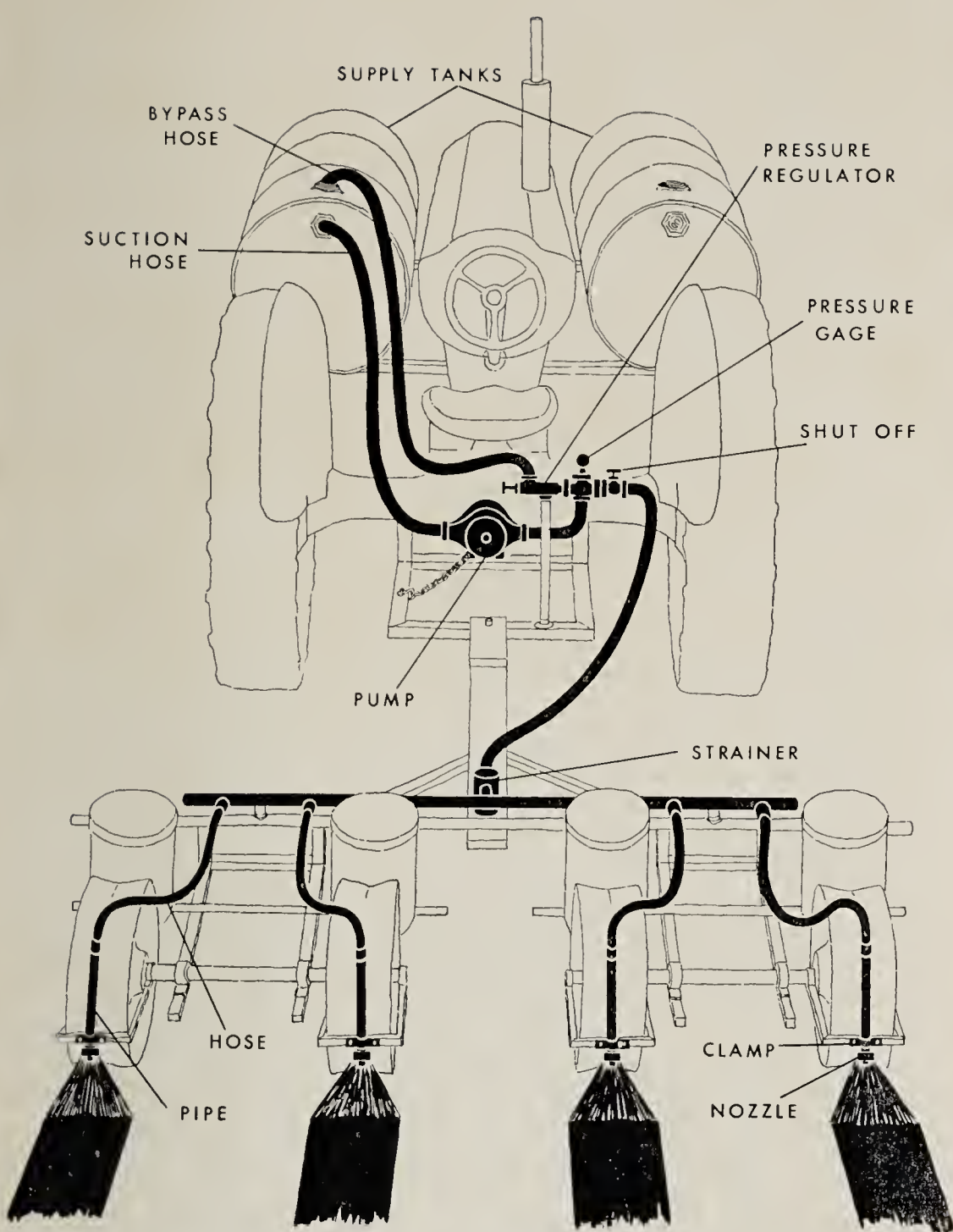


Diagram of band-spray attachment. (Fig. 1)

Preemergence herbicides need to be applied as accurately as possible to provide good weed control and to avoid injury to present or future crops. Read the container label carefully to be sure that you know how much herbicide to use. *Unless specified otherwise, the recommended rates are for broadcast application.*

Because in band spraying you are covering only a portion of the field, the actual amount of solution you will use per crop acre is less than the broadcast rate. But the amount applied to that portion of the soil that is actually treated is the same for both banding and broadcasting. The amount you will use is:

$$\frac{\text{width of band (inches)}}{\text{row spacing (inches)}} \times \text{broadcast rate (gallons per acre)}$$

Table 1. — Amount of Spray Solution to Band Spray One Acre (With a 13-inch Band)

Broadcast rate	Row width (inches)			
	30	36	38	40
<i>gal. per acre</i>	<i>gal. per acre for band spraying</i>			
10	4.3	3.6	3.4	3.2
15	6.5	5.4	5.1	4.9
20	8.7	7.2	6.8	6.5
25	10.8	9.0	8.5	8.1
30	13.0	10.8	10.3	9.8

Example: If you apply a spray for which the recommended broadcast rate is 20 gallons per acre in a 13-inch band on 36-inch rows, you will actually use

$13/36 \times 20$, or 7.2 gallons per crop acre.

Table 1 can also be used to determine the amount of solution used per crop acre.

Check ground speed carefully

Since speed affects the amount of chemical that is applied, it should be checked carefully in the field where the chemicals will be used. Each check should be made with a running start. One method is to set two markers 176 feet apart and check the time (in seconds) required to drive between them. To determine the speed in miles per hour, divide 120 by the travelling time in seconds. Some examples are given below.

Time required to drive 176 feet (seconds)	Speed (miles per hour)
40	3
30	4
24	5
20	6
17	7

Once you have established and checked the field speed, keep the speed uniform during application. You may want to mark the speed indicator dial or the gear and throttle setting. Keep the throttle at the same setting when checking the nozzles as when actually spraying. Tractor speed indicators can be in error because of changes in tire size and wheel slippage so do not rely on them without checking.

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Use the proper nozzle tips and measure output frequently

Several different types of nozzles and nozzle tips are available for spraying herbicides. For band spraying a nozzle with an *even spray tip* should be used. An even spray tip provides uniform distribution across the entire band width. Hollow cone or regular flat fan nozzle tips should not be used for band spraying.

Select a nozzle tip size that will give the proper flow rate at a pressure between 20 and 40 pounds per square inch (20 to 30 is suggested). If the pressure is increased above 30 pounds per square inch, the spray particle size decreases and turbulence increases so the spray particles drift more. If this reduces the amount of herbicide in the band, decreased weed control could be the result.

If you select your nozzle on the basis of 25 pounds of pressure per square inch, you will have some leeway in making the final pressure adjustment. It is better to use larger nozzle tips or reduce speed to increase the rate of application rather than to increase pressure beyond a maximum of 40 pounds per square inch. To double the rate of application without changing nozzle tips or speed, you would have to make the pressure about four times as great.

Table 2 can be used to select and check nozzles for different combinations of ground speed and application rates. The gallons per minute values are useful for selecting nozzles from manufacturers' catalogs and the ounces per minute values are useful for checking nozzles on your sprayer.

Example: You want to apply a herbicide in a 13-inch band at a rate equivalent to 20 gallons per acre broadcast while planting at a speed of 4 miles per hour. Table 2 shows that you need nozzles that will deliver 22.4 ounces or 0.175 gallon per minute. Use a nozzle manufacturer's chart to select a nozzle having this flow rate at a pressure of approximately 25 pounds per square inch.

After selecting the proper nozzles and mounting them on the planter or sprayer, you should check the flow rate of each nozzle. Table 2 can be used for this. With water in the tank of the sprayer, start the pump

Table 2. — Nozzle Flow Rates Required

Broadcast rate	Gro			
	3		4	
<i>gal. per acre</i>	<i>gal. per min.</i>	<i>oz. per min.</i>	<i>gal. per min.</i>	<i>oz. per min.</i>
10	.065	8.4	.087	11.2
15	.098	12.6	.132	16.8
20	.131	16.8	.175	22.4
25	.164	21.0	.218	28.0
30	.196	25.2	.262	33.6

and adjust the pressure to the value for which the nozzles were selected. Collect the spray in a jar or cup marked for ounces. Use a stopwatch or a watch with a sweep second-hand to check the time. Adjust the pressure until you collect the correct number of ounces per minute from a nozzle and then check all of the other nozzles. If a nozzle fails to give the proper flow rate or if its flow rate is significantly different from the others, check to see if it is clogged or damaged and replace it if necessary.

You are now ready to mix the chemical in the spray tank and start spraying. Make sure you spray at the speed and pressure you selected earlier. Table 1 will help you to determine how much you should use per crop acre and per field. After spraying an acre, and also at regular intervals, you should check the amount actually being applied with that recommended. In the example given, to apply the equivalent of 20 gallons broadcast per acre, a 13-inch band on 30-inch rows would require 8.7 gallons per total crop acre; on 36-inch rows, 7.2 gallons; and on 40-inch rows, 6.5 gallons.

Band width

Obtain the band width of 12 to 14 inches by changing nozzle height.

Start with the nozzles 8 to 10 inches above the ground, but make the final adjustment for the band width in the field with the planter in planting position. Turn the sprayer on for a few seconds; then shut it off and measure the width of the wetted strip. Check the band width after the pressure has been set, because the spray angle of the nozzle is affected by pressure.

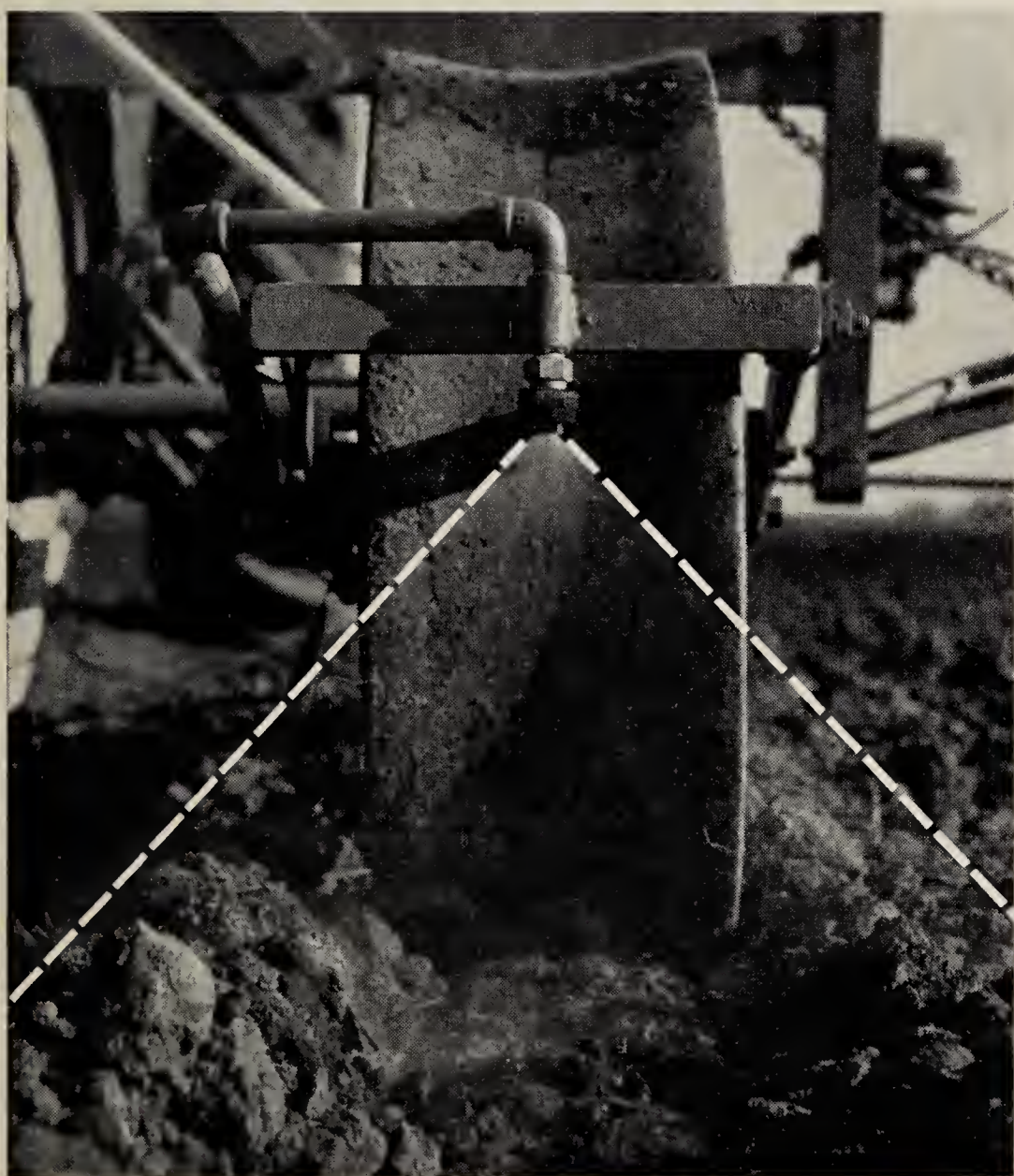
For 13-Inch Band Regardless of Row Spacing

Travel speed (miles per hour)

5		6		7	
gal. per min.	oz. per min.	gal. per min.	oz. per min.	gal. per min.	oz. per min.
.109	14.0	.131	16.8	.153	19.6
.164	21.0	.196	25.2	.229	29.4
.218	28.0	.262	33.6	.306	39.2
.273	35.0	.328	42.0	.382	49.0
.328	42.0	.393	50.4	.458	58.8

Trouble shooting

If the flow rate of the spray pattern is faulty or irregular, the nozzle tip or screen may be plugged or damaged. Use an air hose to blow out particles or clean the tip or screen with a toothpick or toothbrush. Never use a hard object. *Do not touch the nozzle to*



Sprayed band should extend beyond the press-wheel ridges. (Fig. 2)



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the mouth and be sure to discard toothpicks or toothbrushes immediately after use in such a way that children or pets will not pick them up.

Nozzle-clogging problems are often the result of improper mixing, insufficient agitation, a dirty tank or lines, dirty water, or improper screen sizes.

If drift is excessive, reduce the pressure or use wind guards. Larger nozzles may be necessary to get pressure well below 40 pounds per square inch.

If the pressure regulator will not adjust to a low-enough pressure, it may be stuck or the bypass hose may not be large enough.

Caution

Some preemergence chemicals are irritating to the skin. Heed the warnings on the containers and use rubber gloves and goggles when and where recommended. Avoid breathing mists, vapors, or dusts during mixing and application.

Additional information

If you want additional information on the application of herbicides, you may obtain single copies of the following publications from the Office of Publications, 123 Mumford Hall, University of Illinois, Urbana, Illinois 61801, or from your county extension adviser. *Calibrating and Maintaining Spray Equipment*. Circular 1038.

Calibrating and Adjusting Granular Row Applicators. Circular 1008.

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